NGWMN-Montana

Providing mutual benefit

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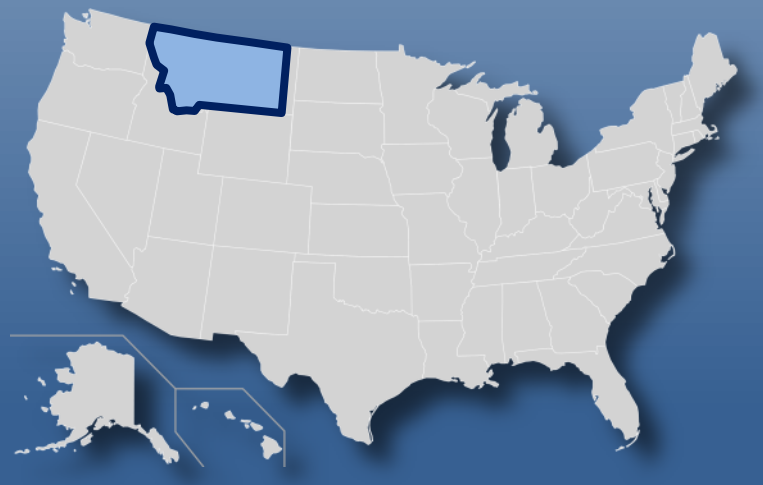
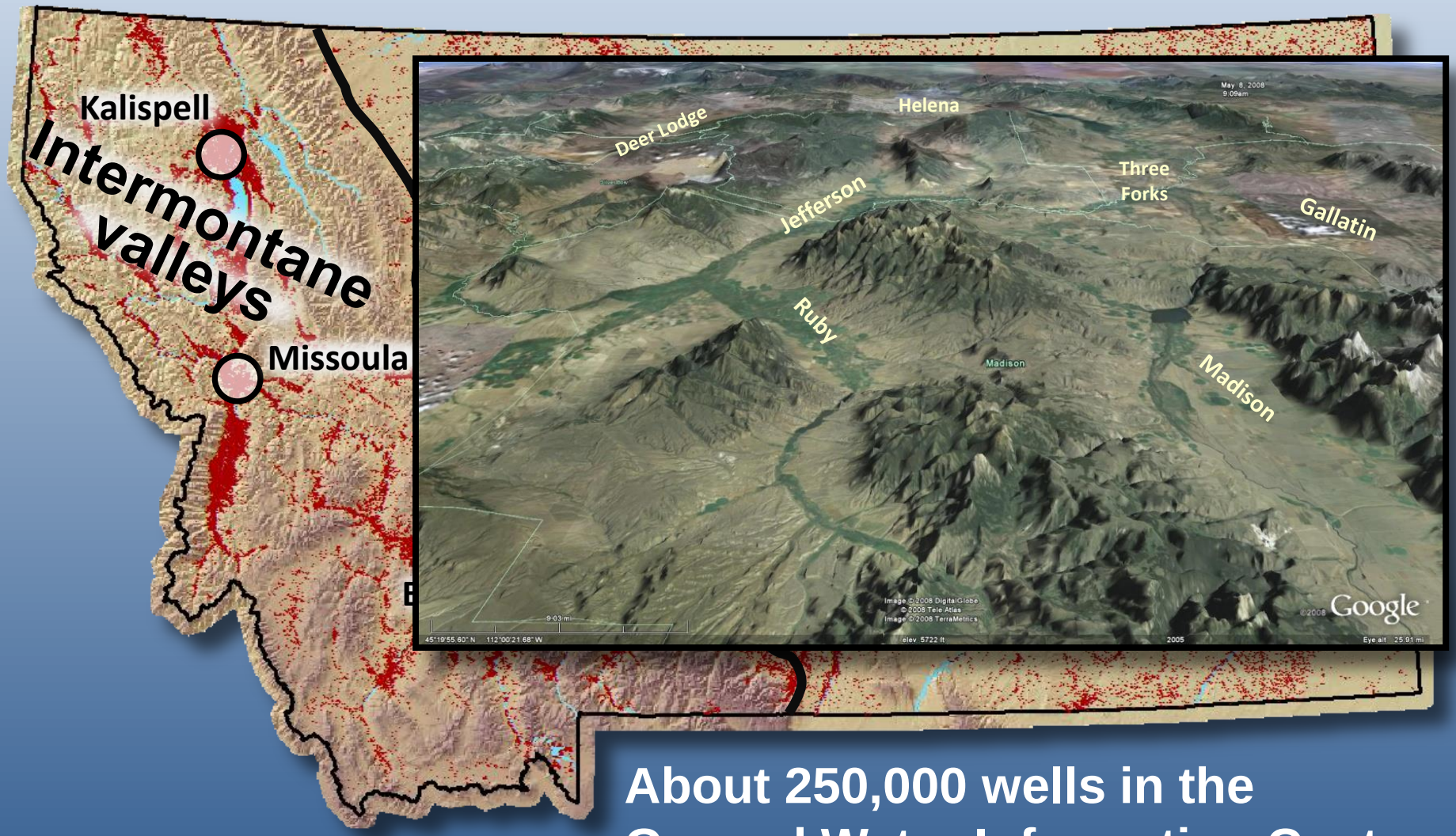
Montana Bureau of Mines and Geology

October 28, 2015

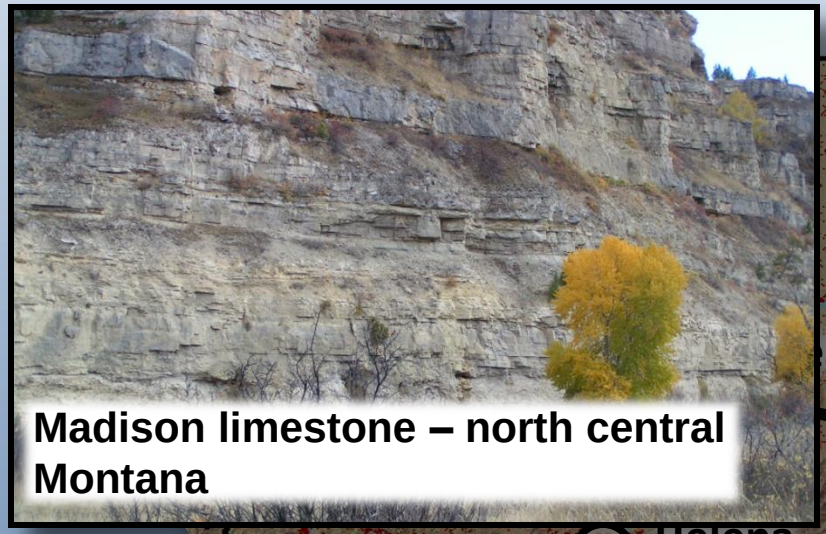


Montana hydrogeology



About 250,000 wells in the Ground Water Information Center (GWIC) database.

Montana hydrogeology

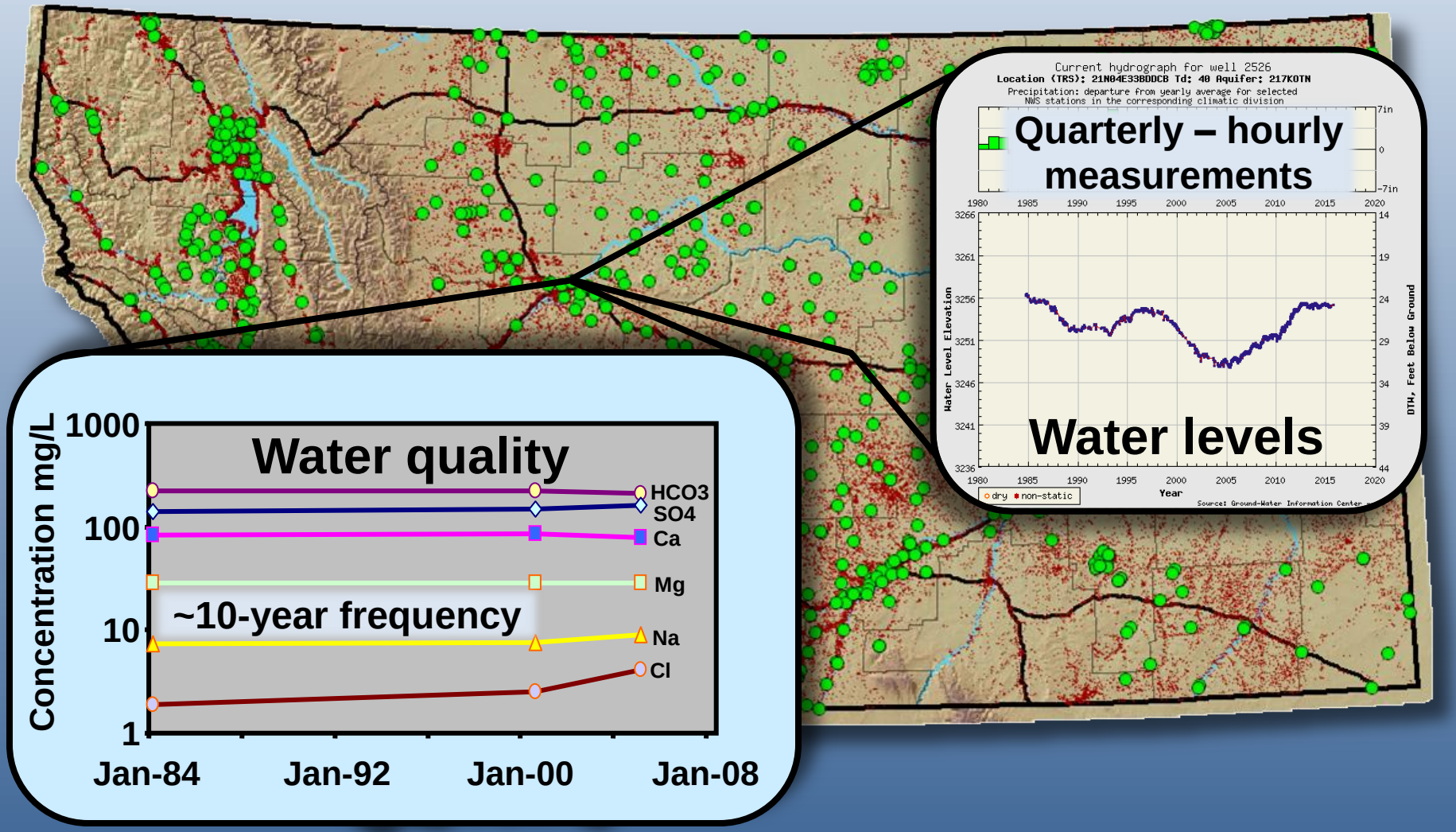


Madison limestone – north central Montana

Fort Union Formation – eastern Montana

About 250,000 wells in the Ground-Water Information Center (GWIC) database.

Monitoring network design

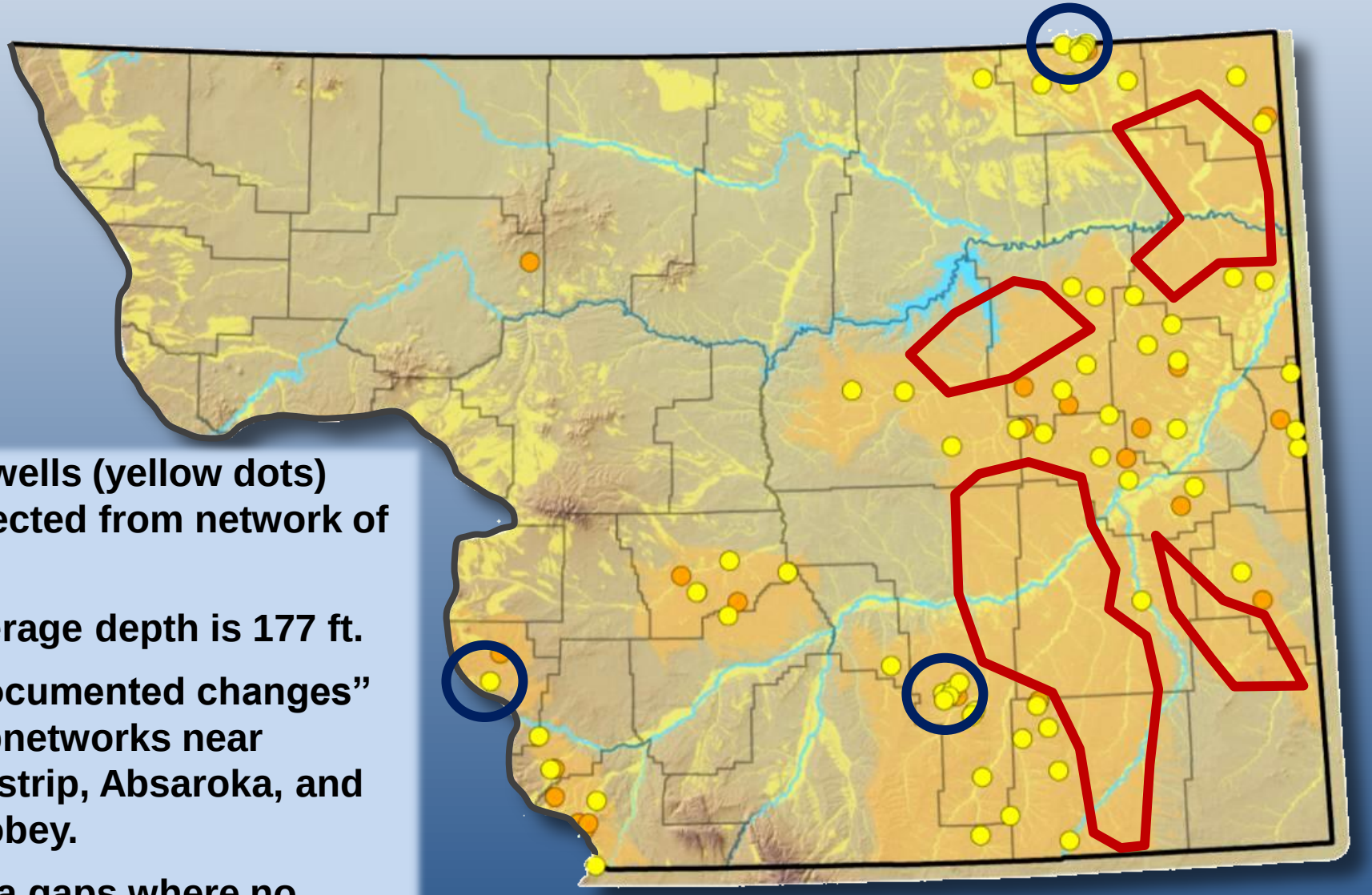


1,010 monitoring wells. About 30 percent (300+/-) dedicated or unused wells: 107 instrumented wells.

NGWMN aquifers (Montana/ classification)

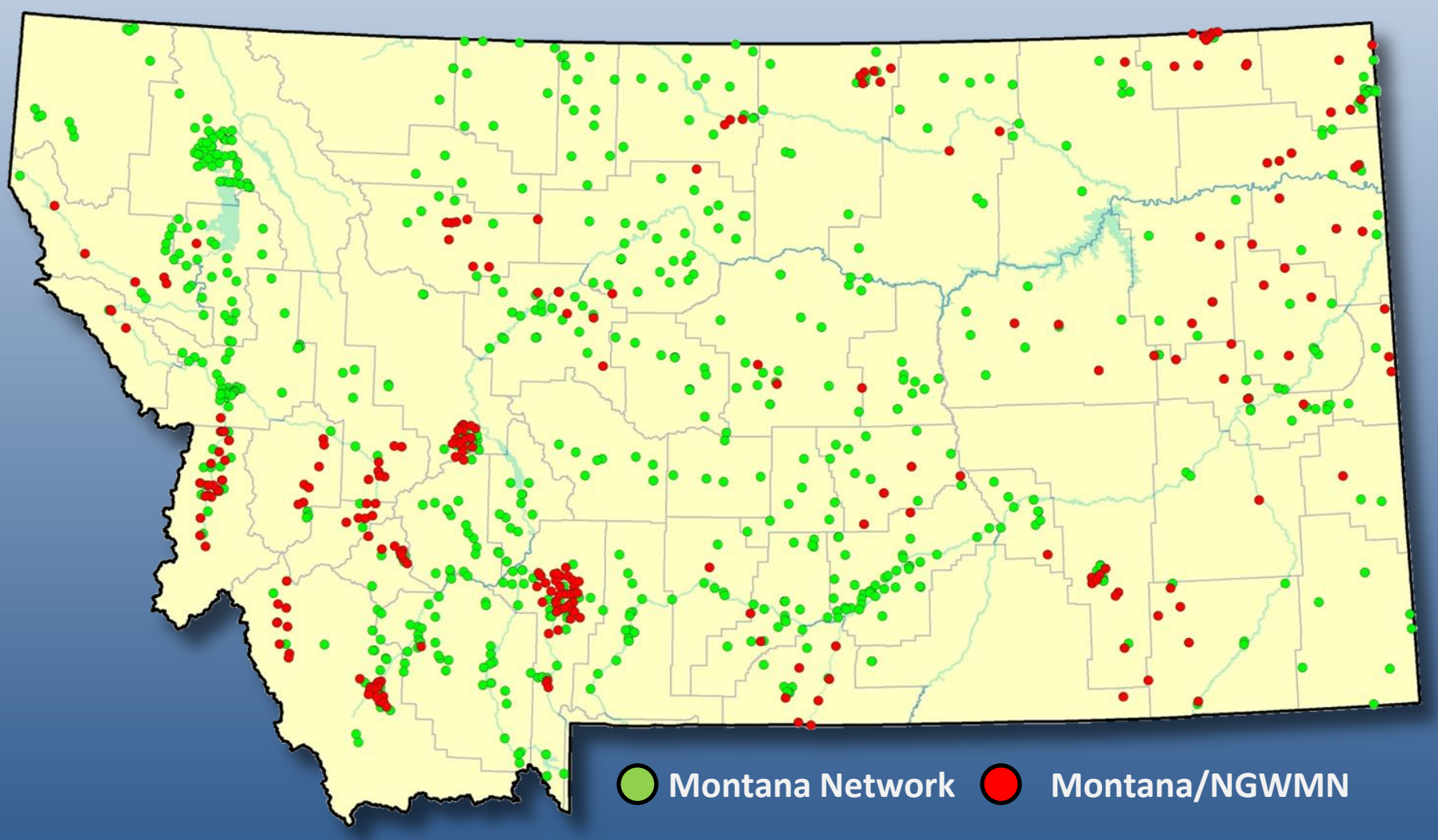
National Aquifer/ System Name	National Aquifer Code	Montana comments
Alluvial	N100ALLUVL	All non-glacial alluvial deposits outside of intermontane basins. Includes Miocene/ Pliocene sand and gravel aquifers in northern Montana.
Glacial regions sand and gravel	N100GLCIAL	Includes glacial sand and gravel deposits in northern Montana.
Northern Rocky Mtns. Intermontane Basins	S100NRMTIB	Includes Quaternary and Upper Tertiary basin-fill deposits and fractured rock associated with intermontane valleys. Includes glacial deposits in the Flathead, Mission, and Missoula valleys.
Pacific Northwest volcanic aquifers	N100PCFNWV	Near West Yellowstone.
Lower Tertiary aquifers	N300LTRTRY	Areas mapped in HA370-I that generally correspond with Lower Tertiary aquifers important in Montana.
Upper Cretaceous aquifers	N300UPCTCS	Includes sandstone aquifers in north-central Montana outside of areas mapped in HA370-I. Most Upper Cretaceous aquifers *within* the mapped areas are deeply buried and not used as aquifers.
Lower Cretaceous	N300LCRTCS	Areas mapped in HA370-I that generally correspond with the Lower Cretaceous.
Paleozoic aquifers	N500PLOZOC	Areas mapped in HA370-I that generally correspond with Paleozoic aquifers

NGWMN (N300LTRTRY)



- **70 wells (yellow dots) selected from network of 97.**
- **Average depth is 177 ft.**
- **“Documented changes” subnetworks near Colstrip, Absaroka, and Scobey.**
- **Data gaps where no monitoring available.**

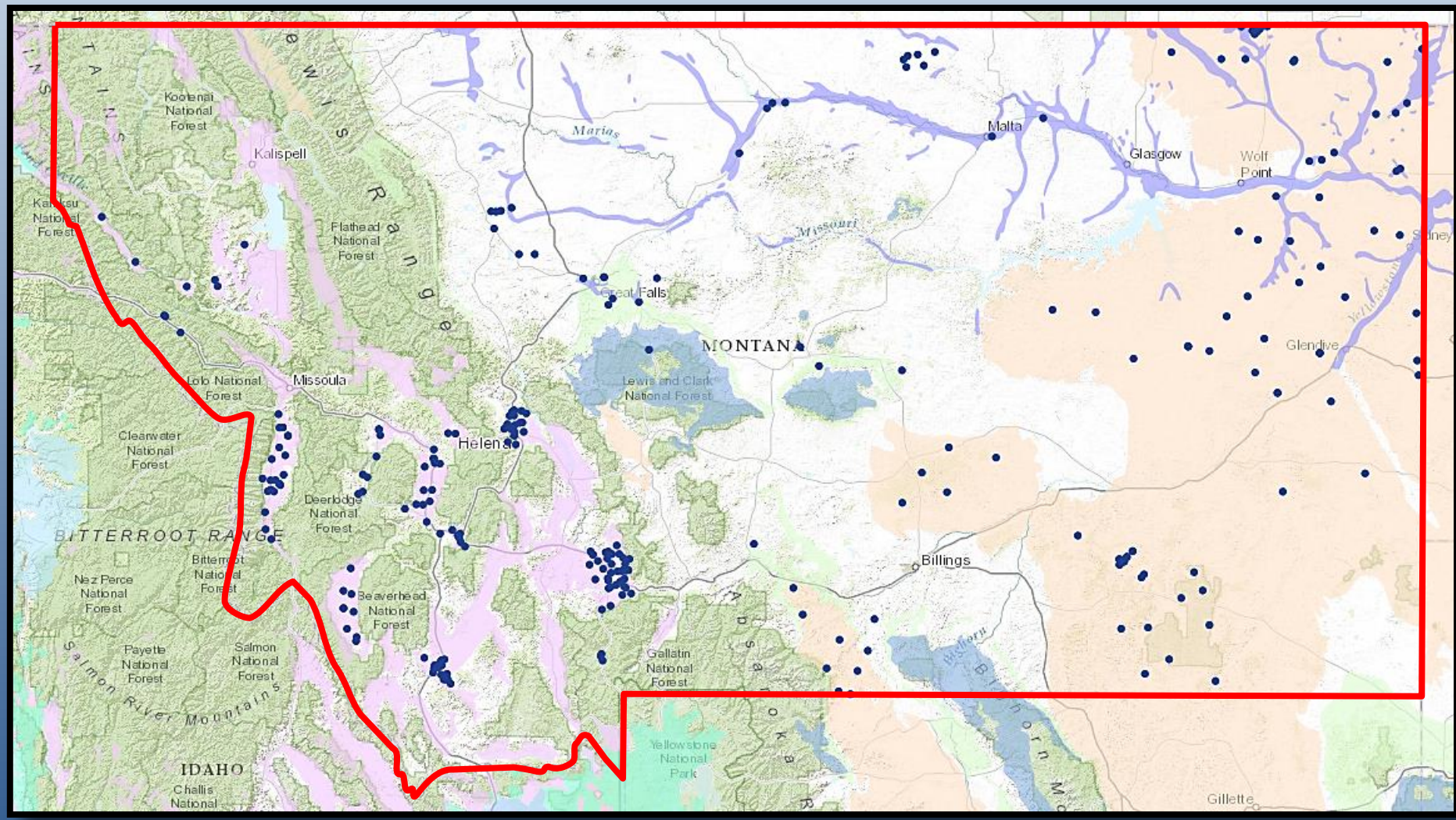
Montana network wells designated as NGWMN sites (trend/background)



Data system and the portal

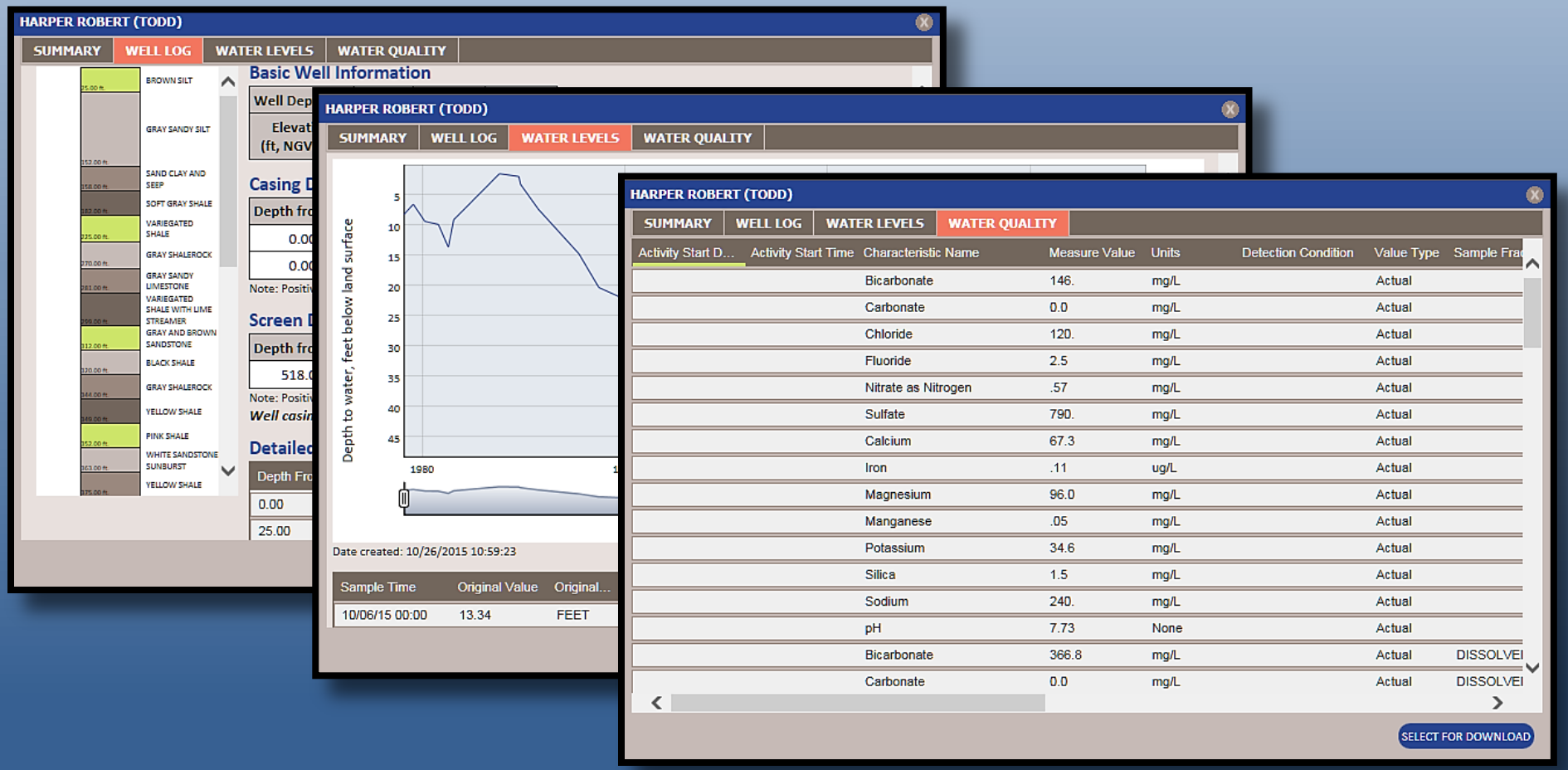
Microsoft SQL Server database:	Data are accessible by web applications; Excel and Access; web mappers, and web services.
Water level frequency:	Quarterly measurements. 100+/- instrumented sites provide hourly/daily values. Updates available quarterly.
Water quality frequency:	Sites sampled every 5-10 years. Analytical data available when released from the MBMG Analytical Laboratory.
Linkage to the NGWMN portal:	Webservices in Geoserver (v2.0.2) provide *casing, completion, lithology, water levels, daily average, and water quality* data.
NGWMN update frequency:	Nightly harvest to NGWMN through CIDA

NGWMN-Montana sites available through the NGWMN portal



Linkage to NGWMN portal

- **NGWMN-Montana sites in the Ground Water Information Center provide construction, lithology, water level, and water quality data.**

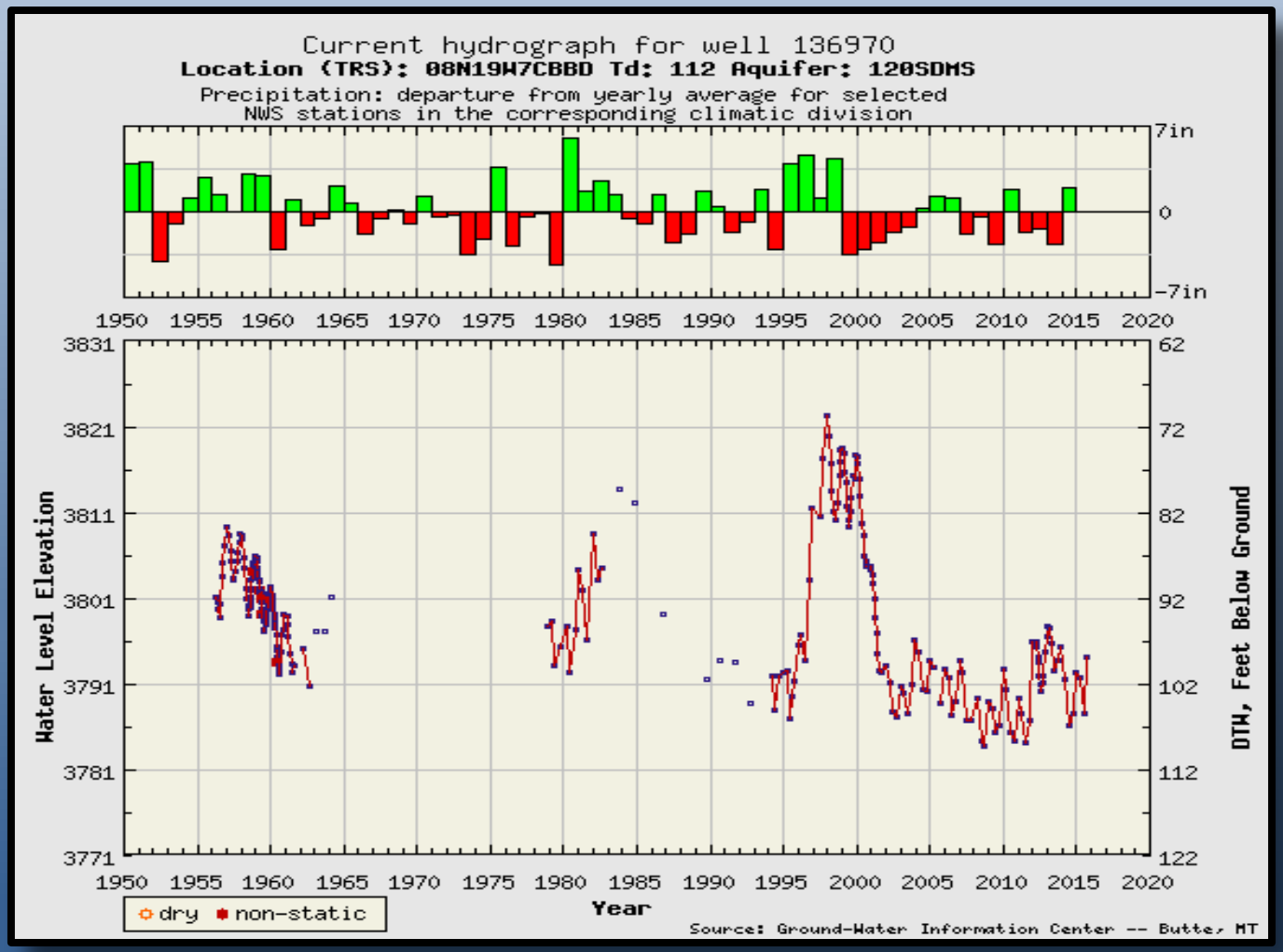


Issues?

- Sorting out subnetworks – surveillance and trend; background, suspected changes, and documented changes?
- Surveillance vs. trend – How do we handle a network where basic SWL measurement frequency is quarterly?
- Well densities – how many wells should there be in aquifers that cross state boundaries? Who determines how many sites are necessary?
- Well densities – the third dimension? Map densities might appear high, but wells are completed in stacked aquifers.

Issues?

- **Maintain multi-decadal records?**




Deer Lodge Valley telemetry site (wells 219909, 219913, and 257455)

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